Canada. Air Board

REPORT

OF

THE AIR BOARD

FOR THE

YEAR 1921

OTTAWA
F. A. ACLAND
PRINTER TO THE KING'S MOST EXCELLENT MAJESTY
1922

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I. GENERAL

Constitution of the Air Board.

Under the authority of the Air Board Act, passed in 1919, the Air Board was appointed for the general control of aeronautics.

At present it is composed as follows:

Chairman: The Hon. G. P. Graham, Minister of Militia and Defence.

Vice-Chairman: (appointment vacant).

Members: Dr. Deville, Surveyor-General of Canada.
Captain Hose, Director of the Naval Service.
Lieut.-General Gwatkin, Inspector-General, C.A.F. (Acting Vice-Chairman).
Lieut.-Colonel Scott, Controller of Civil Aviation.
Lieut.-Colonel Leckie, Director of Flying Operations.

Secretary: Mr. J. A. Wilson.

Departmental organization.

The Board is organized in three main divisions:

(1) The Department of the Controller of Civil Aviation.
(2) The Directorate of Flying Operations; and
(3) The Headquarters of the Canadian Air Force.

Ancillary to these there is a Technical Directorate under Lieutenant-Colonel E. W. Stedman, who is also responsible for stores, supplies and contracts. Besides, there is a Director of Medical Services (Dr. W. H. Cronyn); an Intelligence Officer (Captain F. C. Higgins); and the Secretary of the Board takes charge of finance.

Technical equipment.

After the war, the British Government presented to the Air Board, as a free gift, aircraft and aircraft material worth well over $5,000,000. The time has come when some of this equipment—aircraft in particular—should be replaced.

Expenditure.

In 1921, a sum of $1,625,000 was appropriated:

Administrative expenses	$120,000
Civil aviation	680,000
Air Force	825,000

Approximately, the cost of the Air Force was to that of the Navy as 1:3; and to that of the Militia as 1:14·5.

Liaison with other services.

To co-ordinate effort in pursuit of a common policy and, especially, to ensure the co-operation of the forces—sea, land and air—in the event of war or other emergency, there has been established what is known as "The Defence Committee". It is composed of the Director of the Naval Service, the Chief of the General Staff, the Inspector-General, C.A.F., and the Commissioner, R.C.M.P. It advises on questions relating to organization, administration and combined training, preparation for defence, procedure on mobilization, and on such other questions as may be referred to it.

II. THE INTERNATIONAL CONVENTION

The International Convention for Air Navigation has been the subject of further study, and in regard to it there has been correspondence with the Air Ministry in London.

An Order in Council (P.C. 4596) was approved on December 17, 1921, authorizing the ratification of the Convention, subject to a reservation to Article 5, which latter reads as follows:

> "No contracting State shall, except by a special and temporary authorization, permit the flight above its territory of an aircraft which does not possess the nationality of a contracting State."

The reservation, which is general in its terms, enables Canada to postpone the application of Article No. 5. This was necessary in order that the Dominion Government might have freedom of action in regard to flying arrangements with the United States, which latter, although a signatory to the original Convention, has not yet ratified it.

Reservations to the technical annexes of the Convention have been the subject of further consideration. These were put forward with a view to ensuring a better licensing system and more clearly defining certain clauses of the annexes. The changes recommended by the Air Board have been incorporated in "Air Regulations, 1920", which, therefore, do not wholly conform to the terms of the Convention. Reservations in regard to such details, however, were not insisted on in the ratification, as an understanding had been reached that the technical points raised would be dealt with by a Commission appointed to give further attention to such matters, after the ratification of the Convention.

III. THE DEPARTMENT OF THE CONTROLLER OF CIVIL AVIATION

A statistical summary of civil aviation in Canada, for the year 1921, is given in Appendix A.

Air Regulations (approved by the Governor in Council on December 31, 1919) are based on the Convention relating to International Air Navigation. The Controller of Civil Aviation is responsible that they are carried out. They deal with interstate flying; inquiries into accidents; the licensing of pilots, navigators and engineers; the registration and marking of machines, and the certification of their airworthiness; the inspection and licensing of airharbours; rules of the air; traffic, signals, lights, etc.

They have been operative for two years; and—except by the addition of two sub-paragraphs relative to dangerous flying—it has not been necessary to amend them. The said sub-paragraphs read:—

> "No pilot of any flying machine shall, unless he is alone therein, permit or cause any such flying machine to spin, roll, loop, or execute any other evolution involving unnecessary risk.
>
> "No person shall enter or attempt to enter any aircraft in flight; or leave or attempt to leave any aircraft in flight, except for the purpose of making a parachute descent; or give, upon any aircraft in flight, any gymnastic or other like exhibition."

Up to the present, the Government of the United States has passed no legislation bringing into effect the provisions of the International Air Convention; nor has it regulated the certification of the airworthiness of machines, or the training of pilots, navigators and engineers.

As an interim arrangement it has therefore been necessary for the United States and Canadian Governments to enter into special agreements regarding the conditions under which American aircraft may cross the frontier and land in the Dominion. The agreements so made have each been limited to a period of six months. The first of them became operative in May, 1920; the last in November, 1921.

The general effect is this: So long as they are airworthy and their pilots properly qualified, American machines (other than military) are treated as though they were Canadian; but it is stipulated that, between places in Canada, they may not be engaged, for hire, in the carriage of persons or goods.

Air Regulations provide that if any person is killed or injured in an aircraft accident, the fact must at once be reported, by telegram, to the Air Board; and then, through the medium of the Canadian Air Force Association, a Court of Inquiry is held in the province in which the accident occurred.

The proceedings of the court are forwarded to Ottawa, where the Air Board takes such action as circumstances justify: for example, it may decide to prosecute, if Air Regulations have been broken; if there has been negligence, licenses may be suspended; or, if some fault of design is revealed, the further use of any particular type of machine may be prohibited.

Statistics relating to accidents are given in Appendix B.

With regard to the licensing of pilots, navigators and engineers, the registration and certification of machines and the licensing of airharbours, these duties have been carried on throughout the year in accordance with Air Regulations, as the following statement will show:—

Type of certificate or license	Certificates issued, cancelled, renewed, and still in force during 1921				
	Carried over from 1920	New issues	Lapsed, suspended or cancelled	Renewals or re-in-statements	Total in force on Dec. 31, '21
Air pilots—					
Private	53	10	31	20	52
Commercial	83	75	198	101	61
Airship pilots	–	1	–	–	1
Navigators	–	1	–	–	1
Engineers	83	110	15	1	179
Aircraft, certificates of registration	119	65	38	1	147
Air harbour licenses	37	11	17	–	31
Total	375	273	299	123	472

The efficiency test for personnel is that laid down in the annexes to the International Convention for Air Navigation.

The standard of construction taken as a basis for the air worthiness of aircraft is that adopted in Great Britain.

IV. THE DIRECTORATE OF FLYING OPERATIONS

General remarks.

This Directorate is responsible for the conduct of all flying operations—other than those connected with defence—undertaken by the Air Board for other departments.

In 1920, after the close of the season, an Interdepartmental Conference was held for the purpose of exchanging views and framing a suitable programme of work for 1921.

Besides representatives of the Air Board, the following attended:
The Surveyor-General of Canada.
The Dominion Parks Commissioner.
The Superintendent, Natural Resources Intelligence Branch.
The Superintendent, Geodetic Survey.
The Superintendent, Forestry Branch.
The Controller of Surveys, Topographical Survey Branch.
The Commissioner, R.C.M.P.
The Deputy Minister, Mines Department.
The Assistant Chairman, Conservation Commission.
The Chief Forester, Conservation Commission.
The Inspector of Indian Agencies.
The Superintendent of Fisheries.
The Assistant Entomologist, Department of Agriculture.

It was encouraging to find that the several departments at whose request, in 1920, the Air Board had conducted flying operations, were more than satisfied with the results obtained; and it was with the utmost confidence that, for 1921, the programme of work was extended.

As shown in greater detail in Appendices C and D, the following is a summary of the flying performed at Civil Government Air Stations during the period under review:

Air Stations	Flights	Hrs.-Mins.	Mileage	Flight duration (average)
				Minutes
Vancouver	362	487–58	36,600	82
High River	284	710–05	71,000	150
Victoria Beach	103	184–16	13,818	107
Sioux Lookout	188	329–13	24,693	105
Ottawa	145	269–30	22,907	111
Roberval	102	178–09	13,362	104
Halifax	25	41–25	3,100	100
Total	1,209	2,200–36	185,480	average 108

Vancouver, B.C.

At this Air Station, flying went on all the year round; but most of the work had to do with surveying and forestry, on which account the busiest season was from May to October. Towards defraying the cost of service rendered on its behalf, the Government of British Columbia voted a sum of $20,000.

Operations conducted were these: Forest protection, reconnaissance and photography, for the Forestry Branch, Department of the Interior, as well as for the British Columbia Government; transportation and primary reconnaissance work, for the Geodetic Survey Branch, Department of the Interior; for the Department of Customs, patrols for the prevention of drug smuggling; transportation and fishery protection patrols, for the Department of Fisheries; photographic survey of mosquito breeding areas, for the Entomological Branch, Department of Agriculture; transportation, for the Department of Militia and Defence; reconnaissance flights, for the Water Power Branch, Department of the Interior; a photographic survey of Vancouver Harbour, for the Vancouver Harbour Commissioners; and, for the Public Works Department, a photographic survey of the sand bars in the Fraser Delta.

A sub-station was established at Kamloops, B.C., from which a single machine was operated. This enabled the Forestry Branch, during the period when the hazard of fire is greatest, to keep under observation, as far east as Revelstoke, the valuable

timber areas which lie in the railway belt, in central British Columbia. Transportation work for the Geodetic Survey party engaged in the primary triangulation of the district, was also undertaken.

Machines of a suitable type were not available; in consequence, operations were hampered and risks increased, to some extent. H.S. 2L and F3 flying boats had to be used. In many respects they are good machines; but they are obsolescent, and they are not designed for use in mountainous countries. Their "ceiling" is limited to 6,500 feet; and obvious are the disadvantages of using them in a district where there are peaks from 7,000 to 10,000 feet in height.

High River, Alta.

During 1920, the base of operations in Alberta was at Morley. It was too near the mountains. But further east, one mile from High River, an ideal site was found; and there, early in 1921, an aerodrome was established.

The main object of the Air station is to help in protecting from fire the Crowsnest, Bow and Clearwater forest reserves, on the eastern slopes of the Rocky mountains; and, under conditions by no means easy, admirable work has been performed. Two patrols leave daily—one proceeding north as far as the Clearwater river, the other south to the international border. A wireless station has been installed; and this enables machines, while out on patrol, to keep in touch with the aerodrome, whence reports received can at once be telephoned to the rangers employed by the Forestry Branch.

At the request of the Department of the Interior, a detached operation was carried out in the National Park at Jasper. The superintendent was afforded an opportunity of making a complete reconnaissance of the territory under his jurisdiction. In three days flying he covered the entire area, and gained much useful information regarding portions of it hitherto unexplored.

Again, at the request of the International Joint Commission which is engaged in considering questions connected with water supply in southern Alberta and the state of Montana, a series of photographs were taken from the air. This saved the long delay which would have resulted from a regular survey being made; and the Commission expressed its appreciation of the manner in which the work was carried out.

Victoria Beach, Man.

This Air Station, on the southeastern shore of lake Winnipeg, was established at the request of the Department of the Interior, for the purpose of protecting forest reserves in Manitoba.

The tract of country lying between lake Winnipeg and the western boundary of Ontario, where the danger of fire is greatest, was reconnoitred daily; and weekly, from August to October, a patrol was sent to Norway House. Thence, along the northern and northwestern shores of lake Winnipeg, it flew to Cedar lake; thence south, along lake Winnipegosis, to the town of that name (where the machine was re-fuelled); thence south to lake Winnipeg; and then back, southwest, to Victoria Beach. Also, from Norway House, long-distance patrols were sent to Le Pas, Cumberland House, and the Carrot River triangle in Saskatchewan.

The machines used were flying boats—two F 3, fitted with twin Rolls-Royce engines, for long-distance flights; and, for work closer to the base, an H.S. 2 L., with a Liberty engine.

Minor operations included photographic work on the Winnipeg river, for the Water Powers Branch; also the conveyance of survey parties, with supplies for their maintenance, in the district east of lake Winnipeg.

Engineers of the Reclamation Service were flown over the Carrot River triangle, where they were employed by the Department of the Interior. The engineer in charge

reports that two hours in the air gave him a better grasp of the situation than until then, with the means at his disposal, he had been able to obtain.

Dr. Wallace, the Commissioner of Northern Manitoba, was taken for an extended flight. He too expressed a conviction that the use of aircraft, especially in remote parts of the country, would simplify administration and increase efficiency.

Also the District Forestry Officer of Manitoba recommends that the use of aircraft be extended. He states that, provided with air patrols, he could dispense with the services of a large number of employees who are obliged to make use of canoes as their only means of transportation.

Sioux Lookout, Ont.

An Air Station was established at Sioux Lookout, at the request of the Commission of Conservation and the Department of Lands and Forests of the Provincial Government of Ontario, for the purpose of making a survey of the forest areas which lie east of the Manitoba boundary, north of the Trans-continental Railway.

During the season, an area of 200 miles east and west, averaging about 60 miles north and south, was surveyed from the air by the forest engineers of the Ontario Government. Complete and accurate maps have been prepared, showing in detail the nature of the country; and, after work extending over four months, information which it would have taken years to obtain by ordinary methods, has been made available by the use of aircraft.

Subsidiary bases were established at different times at Minaki and Allanwater; and at Banning, on the southern line of the Canadian National Railway, in the Rainy River district, detached operations were carried out for the Ontario Department of Lands and Forests.

The primary object of the work undertaken by the Air Board in northern Ontario was forest survey, not fire protection; but there were times when the assistance of aircraft was required by the fire-fighting forces, not only for reconnoitring purposes, but also for the transportation of men and supplies to burning areas.

The Government of Ontario contributed $15,000 towards expenses; it has expressed itself satisfied with results obtained, and has asked the Air Board to undertake operations on a larger scale next year.

Ottawa, Ont.

A combined aerodrome and seaplane station has been established at Ottawa, near the Rockcliffe rifle ranges. Throughout the year it was kept in operation.

Under the guidance of Dr. Deville, Surveyor General of Canada, experiments in aerial photography were continued; and a new type of camera, invented by Professor R. H. Cooke, of Princeton University, was subjected to a series of tests.

In conjunction with the Geodetic Survey, experiments in photography were carried out in the Gatineau district; and a mosaic was made of London, Ont.

At the request of the International Joint Commission, photographs of the St. Lawrence river and canal system were taken from the air—with practical results which, the Commissioners report, have been of great value to them. Also, for the use of the Commission and of the Town Planning Branch, Department of the Interior, a mosaic was made of the Welland canal.

A detached station was established at Haileybury, at the request of the Entomological Branch, Department of Agriculture, for the purpose of carrying out investigations in the neighbourhood of lake Timiskaming, where the spruce bud worm had done much damage. The infected regions were reconnoitred; and, after ten days flying, exact information was obtained regarding the extent and location of the plague. Without the help of aircraft, it would have been necessary to have engaged survey parties and to have kept them in the field throughout the season.

Experiments in wireless telegraphy were also carried out, in co-operation with the Radiotelegraph Branch of the Naval Service Department; and, from time to time, other operations for other departments were undertaken.

The machines used were one F.3 and two H.S. 2 L flying boats; one Avro seaplane, one Avro land machine, and one D.H. 4 fitted for photography.

Roberval, P.Q.

This Air Station was established in 1920, at the instance of the Lands and Forests Department of the Quebec Government; which latter has contributed a sum of $20,000 towards maintenance and, in addition, has expended a considerable amount on the erection of permanent buildings.

During the period under review, flying conditions were, on the whole, unfavourable: wet weather prevailed to an unusual extent and, in the early part of the year, smoke interfered with visibility. Nevertheless, surveying operations were carried out over a wide area; and, in anticipation of exploratory work which it is hoped to continue and extend in 1922, caches of petrol were established as far north as lake Mistassini.

Halifax, N.S.

This Air Station is at Baker's Point, on the northeast side of Halifax harbour. It is used, principally, as a depôt for the repair and maintenance of flying boats. It has continued in operation throughout the year; and, during combined manœuvres held in August, it served as a base for the Canadian Air Force.

For the Geological Survey, aerial photographs were taken; and, at the request of the International Boundary Commission, a mosaic was made of a portion of the St. Croix river, regarding which there was some dispute.

Aerial photographs and mosaics.

For the printing and development of aerial photographs, also for the mounting of mosaics, the thanks of the Air Board are due the Natural Resources Intelligence Branch of the Department of the Interior.

V. THE CANADIAN AIR FORCE

The Canadian Air Force was created under powers conferred by section 5 of the Air Board Act; and the principles underlying its constitution are as set forth in Order in Council (P.C. 395) dated February 18, 1920.

It is (as it should be) a separate service—separate, that is to say, from the naval and military services—and it is autonomous. It is capable of expansion in case of emergency, but at other times its functions are almost exclusively instructional. It consists of Headquarters, at Ottawa, and of what is, in effect, a School of Aviation, at Borden Camp. There is no permanent establishment; there are no embodied units; and service formations (thirteen squadrons) exist only upon paper.

At present, Wing Commander J. S. Scott is Officer Commanding at Headquarters; and, at Borden, Squadron Leader J. A. Glen commands the Depôt Training Station.

All of the officers in the Canadian Air Force, and a proportion of the airmen, served during the war in the Royal Air Force. Therefore the standard of efficiency is high, and esprit de corps is very strong; but the time is approaching when fresh blood should be infused.

The authorized establishment is limited to 1,340 officers and 3,905 airmen; towards completing that establishment, 1,281 officers and 1,350 airmen have sent in their names; 505 officers and 1,166 airmen already have been trained; but the actual strength

of the Air Force—that is to say, the number of officers and airmen who, being on duty or under training, are on the pay roll, is as shown below:

Stations	Officers	Airmen	Total
Ottawa	5	4	9
Borden	49	235	284
Total	54	239	293

Borden serves not only as a training centre, but also as a place of storage for aircraft and aircraft material. The British Government erected hutments, workshops, hangars, etc., for the detachment of the Royal Air Force which, during the war, was stationed there. These, left standing when the Royal Air Force withdrew, are utilized, and they afford ample accommodation.

Officers and airmen undergo training for limited periods once every two years; and special facilities are provided for those who make civil aviation their profession.

Training is conducted, as far as possible, on the system which obtains in the Royal Air Force. Both for officers and for airmen there are courses "short" and "long": the former continue for twenty-eight days, the latter for three months. Officers are instructed in flying, also in "ground duties", which include navigation, photography, wireless telegraphy, armament, rigging, repair of engines, and so forth. Airmen, classified by trades, are trained as mechanics.

During the year, the Canadian Air Force co-operated, for training purposes, with the other services.

Two aeroplanes from Borden "spotted" for the batteries of artillery which carried out their annual practices at Petawawa; in co-operation with the cavalry there encamped, they participated in various tactical exercises; also, on several occasions cavalry and artillery officers were taken up and given lessons in "observing" from the air. Fifty-six flights were made. Average duration of flight, one hour; total distance flown, about 4,200 miles.

A machine from the Air Station at High River, Alta., rendered assistance during artillery practice at Sarcee Camp; but it did no more than make one flight—a flight of, approximately 375 miles, covered in five hours.

During September, under the direction of the General Officer Commanding Military District No. 3, a staff tour, in which two machines from Borden took part, was carried out at Kingston, Ont. As a means of gaining intelligence and securing tactical cohesion, the use of aircraft was usefully demonstrated; and, for instructional purposes, military officers were flown over the manœuvre area. Thirty-two flights were made, averaging thirty minutes each; the total distance covered was about 1,200 miles.

Combined exercises, carried out at Halifax, proved interesting and instructive. A detachment of the Canadian Air Force was mobilized at Baker's Point, where it established a base, on the northeast side of the harbour. On August 22, a flying boat patrolled from Chebucto Head to the outer automatic buoy. It reported, by signal, to H.M.C.S. *Aurora,* also to Baker's Point and the Dockyard. On August 23, aircraft reconnoitred the harbour, and watched the movements of ships, outgoing and incoming, between Camperdown and Devil's Island. Numerous messages were sent and received by Aldis lamp and wireless. On August 24, a patrol flew out fifty miles from the coast, met the fleet and escorted it to Halifax, the while maintaining wireless telephonic communication with the base, to which messages were also sent by carrier pigeons released at sea. Eleven flights were made, averaging nearly two hours each, and a total distance of some 1,650 miles was covered.

The Canadian Air Force also carried out, successfully, an aerial survey of Petawawa Camp and its environs. The Natural Resources Branch, Department of the Interior, developed and printed the films, and assembled the mosaic. The map, completed, has been delivered to the Department of Militia, at whose request the survey was undertaken.

Statistics connected with flying and training are given in Appendices C, D and E.

VI. THE CANADIAN AIR FORCE ASSOCIATION

The Canadian Air Force Association was established for the purpose of keeping touch with officers and airmen at times when they are not on duty or under training.

Except in Nova Scotia, New Brunswick and Prince Edward Island, there is in each province a branch, of which the Lieutenant-Governor is honorary president; and for each such branch there is an executive committee, consisting of seven members who serve, normally, for two years. Four of them (representing the Canadian Air Force) are elected, and three are nominated by the Lieutenant-Governor.

For the Maritime Provinces there is but one provincial branch, and its executive committee varies in this respect that the three Lieutenant-Governors nominate one member each.

The special duties of executive committees are to keep rosters of officers and airmen, to detail them for duty and training, to post them to service squadrons and, generally, to attend to matters connected with the recruitment, administration and mobilization of the Canadian Air Force.

Members serve without pay; but to each executive committee is made a grant sufficient to cover incidental expenses and to remunerate a secretary.

Executive committees for the several provincial branches are composed as follows:—

Alberta

His Honour the Lieutenant-Governor.
W. A. R. Kerr, Esq., M.A., Ph.D.
A. H. Clarke, Esq., K.C.
Flight Lieutenant F. R. McCall, D.S.O., M.C., D.F.C.
Flight Lieutenant W. R. May, D.F.C.
Flight Lieutenant D. A. MacRae.
Flying Officer G. W. Gorman.

British Columbia

H. Bell-Irving, Esq.
E. V. Peters, Esq.
N. A. Yarrow, Esq.
Wing Commander J. Scott Williams, M.C., A.F.C.
Squadron Leader A. M. Lester.
Squadron Leader R. H. B. Ker.
Flight Lieutenant E. C. Hoy, D.F.C.

Manitoba

D. C. Coleman, Esq.
E. P. Featherstonhaugh, Esq.
C. F. Gray, Esq.
Flight Lieutenant A. A. Leitch, M.C., D.F.C.
Flight Lieutenant J. H. Cathcart.
Flight Lieutenant R. E. Spear.
Flying Officer F. G. Mathers.

Maritime Provinces

J. O. Hyndman, Esq.
W. H. Dennis, Esq.
Squadron Leader R. A. Logan.
Flight Lieutenant J. L. M. White, D.F.C.
Flying Officer A. McGregor, D.F.C.
Pilot Officer A. E. Stephenson.
Pilot Officer H. H. Whitelock.

Ontario

Sir John Aird.
Lieut.-Col. R. W. Leonard.
Lloyd Harris, Esq.
Wing Commander D. G. Joy, A.F.C.
Squadron Leader B. S. Wemp, D.F.C.
Flight Lieutenant A. J. Hember.
Flying Officer W. R. Maxwell.

Quebec

Lieutenant-Colonel J. A. Scott.
L. H. A. Amyot, Esq.
E. Greenwood, Esq.
Wing Commander R. F. Redpath.
Flight Lieutenant F. S. McGill.
Flight Lieutenant G. R. Hodgson, A.F.C.
Flight Lieutenant C. F. Falkenberg, D.F.C.

Saskatchewan

Brig.-General G. S. Tuxford, C.B., C.M.G.
James Balfour, Esq., K.C.
A. R. Greig, Esq., B.Sc.
Flight Lieutenant R. A. Delhaye, D.F.C.
Flight Lieutenant W. F. N. Forrest, D.F.C.
Flight Lieutenant J. B. Home-Hay, M.C., D.F.C.
Flight Lieutenant J. R. Hopkins, D.F.C.

VII. TECHNICAL SERVICES AND STORES

Organization.

This Directorate comprises a Technical Section and a Stores Section (the latter now includes what used to be known as the Equipment Branch). An aeronautical engineer of high standing is in charge of it; he is an active member of the Associate Air Research Committee, as well as of the Canadian Engineering Standards' Association.

Technical Section.

The work carried out in this section has embraced:—

(1) Calculations to determine stability and strength of construction, with a view to ascertaining the airworthiness of commercial aeroplanes.

(2) The drafting of specifications for all materials used in aircraft. Generally speaking, these have been similar to the British Engineering Standards' specifications; but, in some cases, questions relating to them have been referred to the Sub-Committee

of the Canadian Engineering Standards' Association. They have been issued to universities, to commercial companies operating aircraft, and to others interested.

(3) The inspection and testing of materials purchased by the Air Board for use at Air Stations.

(4) The design of a flying boat adapted to conditions peculiar to Canada.

(5) The examination of aircraft and engines; and in connection therewith, advice with regard to defects, modifications, overhaul, repairs, and so forth.

Stores Section.

During the year, beyond duties of a routine nature, the principal work carried out by this section was the sorting, conditioning and storing of material received, in 1921, from the surplus war stocks of the British Government. An immense amount of labour was involved; without the help of the Canadian Air Force and the Flying Operations Branch, the task undertaken could not have been performed.

Research.

Under the Advisory Council for Scientific and Industrial Research, the Associate Air Research Committee has continued to co-operate with the Air Board; and all connected with it have shown keen interest in the questions which have been referred to them.

The work carried out has been of a practical character and, for the most part, it has been confined to problems peculiar to aviation in Canada. The results obtained have been communicated to the Air Ministry and, unless confidential, to commercial firms and other bodies.

For the purpose of determining by exposure, under various atmospheric conditions, the effect of weather on doped fabric, samples have been sent out to the different meteorological stations throughout the Dominion. Professor Robb, of the University of Alberta, has been studying the effect of low temperatures on combustion, lubrication and cooling; Mr. Stanley Smith, of Edmonton, has devoted attention to barograph diaphragms; Professor MacKergo, of McGill University, has compounded anti-freeze mixtures; Professor Parkin, of the University of Toronto, has experimented with the wind tunnel—an appliance for testing lift and resistance; the storage of oil in cold weather, and the effects of low temperatures on aeroplane rigging, have been investigated, respectively, by Professor Bain and Professor Gillespie, both of Toronto University; and it is to be observed that the services rendered by all these gentlemen have been honorary.

VIII. METEOROLOGY

Meteorology has an important bearing on aviation; and during the year Sir Frederick Stupart, Director of the Meteorological Service, has continued to co-operate with the Air Board.

Mr. Paterson, a member of Sir Frederick's staff, visited all of the Air Stations, and gave instruction in the use of pilot balloons for the measurement of upper air-currents. Daily observations were kept, and the results obtained were communicated to the Meteorological Office at Toronto.

Plans for the extension of this work, and for the publication of flying weather forecasts in the press, as a guide to pilots, are under consideration.

IX. MEDICAL SERVICES

Civil Aviation.

Commercial pilots, before being certified as such, are examined by medical officers appointed by the Air Board; and thereafter they must be re-examined every six months, otherwise their certificates are cancelled or suspended.

Private pilots likewise undergo medical examination, and every twelve months they are re-examined.

Canadian Air Force.

During the year, 158 cases were admitted to hospital at Borden Camp. Of 389 officers examined there were found—

Pilots—	
Fit to fly	305
Unfit to fly but fit for ground duties	23
Ground Officers—	
Fit	60
Unfit	1

Eight medical officers underwent short courses. They were instructed in hospital administration and in the specific medical flying tests. They also had opportunities of flying as passengers.

Hospital orderlies were taught first aid, dispensing, urinalysis, and general ward duties.

Lectures were delivered to officers and airmen on venereal disease and personal hygiene; and a first aid class was formed at which instruction was given in bandaging, splinting, and control of hemorrhage.

X-ray Work.

An X-ray plant, completely equipped, is installed at the station hospital at Borden. Last year 123 plates were taken for general diagnostic purposes, as well as a number of dental films.

Dental Services.

A dental officer visits the camp and attends to the dental requirements of officers and airmen.

Sanitation.

Sanitary arrangements are maintained in a satisfactory condition. Camp premises are regularly visited by the medical officer in charge. The water supply is inspected; the milk is tested, and the dairies whence it comes are kept under supervision.

Dealings with other Departments.

To the Department of Militia and Defence and the Department of Soldiers' Civil Re-establishment thanks are due for their co-operation with the Air Board. They provided stores and apparatus, either on repayment or free of charge; and the hospital service, S.C.R., was helpful on many occasions.

X. THE INTELLIGENCE BRANCH

The special duty of this branch is to collect, classify and disseminate intelligence regarding aviation.

The Air Ministry in London has furnished the Air Board with technical handbooks and training manuals, also with various publications dealing with aeronautical developments; reports have been exchanged with other self-governing dominions; and much information has been supplied by the Army and Navy Air Service Departments of the United States—a courtesy gratefully acknowledged.

Three "progress reports" have been issued; they give full details of flying operations carried out during the period January to September. For the remaining months of the year, a further report is in course of preparation.

Numerous statistics have been compiled relating, for example, to the development of commercial flying and the conduct of flying operations; notices, directions and announcements have been issued affecting civil aviation; and, so far as possible, information regarding aeronautical subjects has been communicated to all who sought it.

The value of the Air Board library has been established; it is available for use by scientific institutions, and by members of the public interested in aeronautics. Bibliographies have been drawn up and circulated; they relate to subjects of particular interest in Canada, such as the employment of aircraft in connection with forestry protection and photographic surveys.

Lantern slides and other material for illustrating lectures have been issued for the use of engineering societies, technical schools, and universities.

The Exhibits and Publicity Bureau, Department of Trade and Commerce, has greatly assisted the Air Board in the reproduction of photographs required for insertion in progress reports, as well as in the preparation of slides and films intended for instructional purposes.

XI. THE FINANCE BRANCH

Effective measures have been taken to control the expenditure and to account for the revenue of the Air Board.

The system adopted was investigated by a committee of experts appointed for such purposes by the Civil Service Commissioners, and it was approved; it reveals the amount spent on each operation undertaken, and furnishes valuable data in regard to cost of flying, maintenance of stations, depreciation, and so forth.

In its financial aspects, the future development of aviation is being closely studied; and the Air Board is ever ready to place at the disposal of commercial companies the knowledge and experience it has gained.

APPENDIX A

STATISTICAL SUMMARY OF CIVIL AVIATION IN CANADA FOR THE YEAR 1921 (*a*)

Nature of Information	Commercial	Civil Government	Total Combined
General Analysis			
Firms chiefly manufacturing aircraft	1	–	1
Firms chiefly jobbing aircraft	1	–	1
Firms chiefly operating aircraft	27	–	27
Firms employing aircraft as auxiliary service	2	–	2
Machine-flights made	10,386	1,209	11,595
Machine-hours flown	4,347	2,200	6,547
Aeroplane machine-mileage (approximate)	242,452	84,057	326,509
Seaplane machine-mileage (approximate)	51,997	101,423	153,420
Total machine-mileage (flying machines)	294,449	185,480	479,929
Average flight duration	25 mins.	1 hr. 48 m.	34 mins.
Number of pilots carried	10,386	1,209	11,595
Number of crew carried	–	936	936
Number of passengers carried	9,153	(*b*) 1,329	10,482
Total personnel carried	19,539	3,474	23,013
Pilots carried one mile (pilot-miles)	294,449	185,480	479,929
Crew carried one mile (crew-miles)	–	111,543	111,543
Passengers carried one mile (passenger-miles)	276,655	199,724	476,379
Total personnel carried one mile (personnel-miles)	571,104	496,747	1,067,851
Total freight or express carried (lbs.)	79,850	(*c*)	79,850
Licensed Civil Air Personnel			
Pilots only (flying machines)	79	14	93
Pilot-Air Engineers	60	17	77
Pilot-Air Navigators	–	–	–
Pilot-Air Engineer-Air Navigators	–	1	1
Air Engineers only (flying machines)	84	31	115
Air Engineer-Air Navigators	–	–	–
Air Navigators only (flying machines)	–	–	–
Airship Officer Pilots (1st class)	–	1	1
Balloon Pilots	–	–	–
Total licensed personnel	223	64	287
Unlicensed air mechanics employed	26	46	72
Licensed Civil Aircraft			
Aeroplanes (single engined)	58	11	69
Aeroplanes (twin engined)	–	–	–
Float Seaplanes (single engined)	6	3	9
Float Seaplanes (twin engined)	–	–	–
Boat Seaplanes (single engined)	9	18	27
Boat Seaplanes (twin engined)	–	4	4
Amphibians (single engined)	–	–	–
Amphibians (twin engined)	–	–	–
Airships	–	–	–
Balloons	–	–	–
Total aircraft (all types)	73	36	109
Licensed Civil Airharbours			
Aerodromes (public)	7	–	7
Aerodromes (private-commercial)	21	1	22
Licensed also for Customs	6	–	6
Seaplane Stations (public)	1	–	1
Seaplane Stations (private-commercial)	6	4	10
Licensed also for Customs	1	–	1
Aerodrome-Seaplane Stations (public)	–	–	–
Aerodrome-Seaplane Stations (private-commercial)	–	1	1
Licensed also for Customs	–	–	–
Airship Harbours	–	–	–
Licensed also for Customs	–	–	–
Total airharbours (all types)	35	6	41

(*a*) This summary does not include private flying. During the year, forty-six persons have held private pilots' certificates only, and two private aircraft have been registered.
(*b*) Government officials and employees.
(*c*) Figures not available.

APPENDIX B

STATISTICAL SUMMARY OF CIVIL AVIATION ACCIDENTS FOR THE YEAR 1921

Nature of Information	Commercial	Civil Government	Total Combined
ANALYSIS OF ACCIDENTS			
Flying accidents resulting in death to one or more occupants of machine	3	1	4
Flying accidents resulting only in injury to occupants of machine	2	1	3
Flying accidents not involving injury to occupants of machine	10	1	11
Total flying accidents	15	3	18
Flying accidents (included above) resulting in death to third party	1	–	1
Flying accidents (included above) resulting only in injury to third party	–	–	–
Flying accidents (included above) not involving injury to third party	14	3	17
Flying accidents (included above) resulting in death to occupants or third party	4	1	5
Flying accidents (included above) resulting only in injury to occupants or third party	1	1	2
Flying accidents (included above) not involving injury to any personnel	10	1	11
CASUALTIES TO PERSONNEL			
Pilots killed	1	1	2
Pilots injured	3	1	4
Crew killed	(*a*) –	–	–
Crew injured	(*a*) –	1	1
Passangers killed	2	–	2
Passengers injured	2	–	2
Third party killed	1	–	1
Third party injured	1	–	1
Total personnel killed	4	1	5
Total personnel injured	6	2	8
ACCIDENT AND CASUALTY RATES			
Number of machine-miles per accident	19,630	61,826	26,662
Number of machine-flights per accident	692	403	644
Number of machine-hours per accident	290	733	364
Pilots killed per 1,000 miles flown by pilots	·0034	·0052	·0041
Pilots injured per 1,000 miles flown by pilots	·0102	·0052	·0082
Crew killed per 1,000 miles flown by crew	–	–	–
Crew injured per 1,000 miles flown by crew	–	·0089	·0089
Passengers killed per 1,000 miles flown by passengers	·0072	–	·0042
Passengers injured per 1,000 miles flown by passengers	·0072	–	·0042
Passengers killed per 1,000 passengers carried	·218	–	·1904
Passengers injured per 1,000 passengers carried	·218	–	·1904
Third party killed per 1,000 machine-miles	·0034	–	·0029
Third party injured per 1,000 machine-miles	·0034	–	·0029

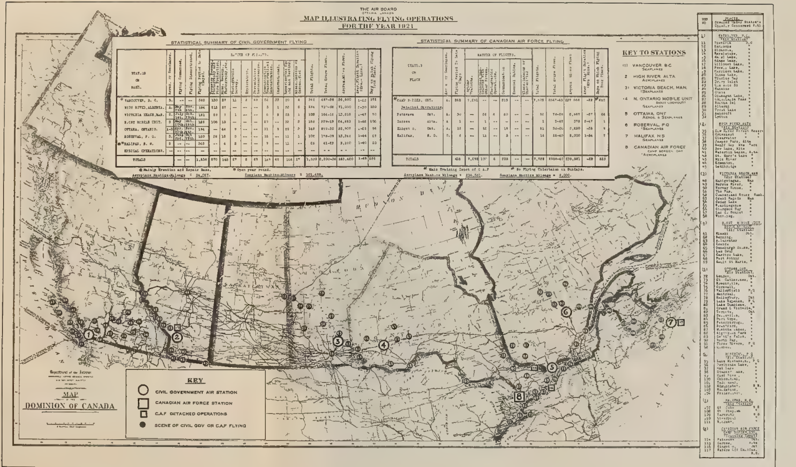
(*a*) No crew carried as such.

APPENDIX E

STATISTICAL SUMMARY OF CANADIAN AIR FORCE TRAINING AT CAMP BORDEN FOR PERIODS AS SHOWN.

	Classification.	1920.	1921.					Grand Total 1920 and 1921.
		⊙Total (1 Quarter).	1st Quarter	2nd Quarter	3rd Quarter	4th Quarter	Total 1921.	
Completed Training.	*Officers' Short Course (Flying)	73	133	87	40	32	292	365
	" " " (Ground)	3	2	13	24	11	50	53
	aOfficers' Long Course (Flying)	6	4	9	2	5	20	26
	" " " (Ground)	4	3	1	3	6	13	17
	Total Officers	86	142	110	69	54	375	461
	Airmen's Short Course	88	229	245	113	83	670	758
	" Long Course	23	77	23	42	23	165	188
	Total Airmen	111	306	268	155	106	835	946
Average Strength Return.	||Long Course (Officers/Airmen)	18/ 69	23/122	19/117	17/ 95	15/101	18/109	18/101
	Short Course " "	28/ 74	42/217	29/106	19/ 98	22/103	28/131	28/119
	Total in Camp " "	46/143	65/339	48/223	36/193	37/204	46/240	46/220
Flying Time.	Monthly Aver.—Flying Hrs. Per Pupil	11–23	8–43	8–12	12–44	10–32	10–03	10–19
	Monthly Aver.—Flying Hrs. Per Instructor	27–95	32–37	24–28	29–48	16–08	25–45	26–05
	Total Flying Hrs. in Camp	733	1,024	633	540	423	2,620	3,353

*Officers' and Airmen's "Short Course" training normally covers a period of 28 days. In certain cases, however, where further instruction is necessary, "Extended" Short Course training is given for an additional period of 2 months or less as required. aOfficers' and Airmen's "Long Course" training covers a varying period of 3 months or more as circumstances may require. ||Administrative and Instructional Staff. ⊙From commencement of training on Oct. 1st.


THE AIR BOARD
OTTAWA CANADA
MAP ILLUSTRATING FLYING OPERATIONS
FOR THE YEAR 1921
KEY TO STATIONS
(1) VANCOUVER B.C. SEAPLANES
2 HIGH RIVER ALTA AEROPLANES
3) VICTORIA BEACH, MAN. SEAPLANES
4 N. ONTARIO MOBILE UNIT (SIOUX LOOKOUT) SEAPLANES
5 OTTAWA, ONT AEROS & SEAPLANES
6 ROBERVAL, P.Q. SEAPLANES
7 HALIFAX N.S. SEAPLANES
8 CANADIAN AIR FORCE CAMP BORDEN, ONT AEROPLANES
KEY
CIVIL GOVERNMENT AIR STATION
CANADIAN AIR FORCE STATION
C.A.F. DETACHED OPERATIONS
SCENE OF CIVIL GOV OR C.A.F. FLYING
Department of the Interior
MAP
DOMINION OF CANADA
HUDSON BAY
REF NO
PLACES.
Grouped Under Stations Chiefly Concerned
(1) VANCOUVER, B.C. (Air Station)
11 Victoria B.C.
12 Kamloops
13 Sicamous
14 Revelstoke
15 Nakusp Lake
16 Adams Lake
17 Lillooet Lake
18 Pavelly Lake
19 Harrison Lake
20 Quesnel Lake
21 Thurlow Bay
22 Drury Inlet
23 Queen Charlotte Is
24 Nanaimo
25 Comox
26 Okanagan Lake
27 Coquihalla Pass
28 Nootka Isl
29 Alberni
30 Trout Lake
31 Bancroft
32 Lytton
(2) HIGH RIVER ALTA (Air Station)
35 Bow River Forest Reserve
36 Crowsnest
37 Clearwater
38 Jasper Park, Alta
39 Banff Nat Park
40 Bow Lake, Alta
41 Waterton Lakes, Alta
42 St. Mary's Lake
43 Milk River
44 Edmonton
45 Lethbridge
(3) VICTORIA BEACH, MAN (Air Station)
48 Manigotagan, Man
49 Berens River
50 Norway House
51 The Pas
52 Cumberland House Sask.
53 Grand Rapids Man
54 Cedar Lake
55 Wanipigow
56 Sturgeon Bay
57 Lac du Bonnet
58 Winnipeg
(4) N. ONT. MOBILE UNIT, SIOUX LOOKOUT (Air Station)
61 Minaki Ont.
62 Banning
63 Allanwater
64 Ombabika
65 Osnaburgh House
66 Lac Seul
67 Caribou Lake
68 Port Arthur
69 Sault St Marie
(5) OTTAWA, ONT. (Air Station)
72 London Ont.
73 St Catharines
74 Brockville
75 Cornwall
76 Valleyfield P.Q
77 Montreal
78 Haileybury Ont
79 Lake Expanse P.Q
80 Lake Dumoine
81 Grand & Victoria
82 Toronto Ont
83 Belleville
84 Port Hope
85 Peterborough
86 Brantford
87 Muskoka Lakes
88 Algonquin Park
89 Smith's Falls
90 North Bay
91 Three Rivers P.Q
92 Quebec
(6) ROBERVAL, P.Q (Air Station)
97 Lake Mistassini P.Q
98 Peribonka Lake
99 Mal Lake
98 Chapman Lake
99 Chef River
100 Chicoutimi
101 Tadoussac
102 Edmundston N.B.
103 Woodstock
104 Fredericton
(7) HALIFAX, N.S. (Air Station)
107 St John N.B
108 St Stephen
109 Yarmouth N.S.
110 Liverpool
111 Windsor
(8) CANADIAN AIR FORCE CAMP BORDEN, ONT. (Training Depot)
114 Petawawa Ont.
115 Sarcee Alta
116 Kingston Ont
117 Waters off Halifax N.S.

STATISTICAL SUMMARY OF CIVIL GOVERNMENT FLYING

Station or Base.	Aeros. or Seaplanes.	Flying Commenced.	Flying Discontinued.	Flying Period to Date (Days).	Nature of Flights: Forestry Reconnaissance Sketching and Fire Protection.	Misc. Reconn., Photography, etc.	Photographic Survey.	Exploration.	Preventative Reconnaissance.	Communication Transportation Demonstration.	Instructional.	Experimental Flying and Testing.	Miscellaneous or Unclassified.	Total Flights.	Total Hours Flown.	Approx. Miles Flown.	Aver. Flight Duration (Hrs.-Mins.)	Days on which flying took place.
* VANCOUVER, B. C.	S.	--	--	365	120	37	11	2	69	54	33	10	4	242	487-58	36,600	1-52	176
HIGH RIVER, ALBERTA.	A.	May 5th	Nov. 6th	184	215	37	—	—	--	3	1	22	6	284	317-06	71,000	2-30	150
VICTORIA BEACH, MAN.	S.	July 1st	Oct. 29th	121	69	7	1	--	--	6	8	25	1	103	164-12	13,815	1-47	70
N. ONT MOBILE UNIT.	S	May 27th	Oct. 28th	159	108	13	—	—	—	27	--	32	5	186	279-19	24,633	1-46	106
OTTAWA, ONTARIO.	L-S	Apr. 29th	Nov. 4th	184	—	64	9	--	--	51	9	29	5	148	259-20	22,907	1-01	96
ROBERVAL, P. Q.	S.	June 2nd	Oct. 19th	150	28	13	5	--	--	16	--	11	1	102	176-09	15,242	1-44	67
@*HALIFAX, N. S.	S	--	--	365	--	4	3	—	—	7	—	11	--	26	41-22	3,100	1-40	20
SPECIAL OPERATIONS.	--	--	--	—	--	—	—	—	--	--	--	--	—	--	- -	- -	--	--
TOTALS		—	—	1,536	570	145	27	2	69	167	45	164	17	1,200	2,200-36	185,460	1-48	658

@ Mainly Erection and Repair Base. * Open year round.

Aeroplane Machine-Mileage = 84,067. Seaplane Machine-Mileage = 101,423.

STATISTICAL SUMMARY OF CANADIAN AIR FORCE FLYING

Station or Place	Aeros or Seaplanes.	Flying Period To Date (Days)	Nature of Flights: Regular Training.	Co-operation with Other Forces.	Photographic Operations.	Communication	Special Duties.	Miscellaneous or Unclassified	Total Flights.	Total Hours Flown.	Approx. Miles Flown	Aver. Flight Duration (Hrs. Mins.)	Days on Which Flying Took Place.
# CAMP BORDEN, ONT.	A.	365	7,091	--	--	515	--	--	7,605	2547-45	257,668	-22	ø 263
Detached Operations.													
Petawawa Ont.	A.	30	—	56	6	20	--	—	82	76-25	6,987	-57	44
Sarcee Alta.	A	1	--	1	--	—	--	--	1	5-47	378	5-47	1
Kingston, Ont.	A.	12	—	32	--	19	--	—	51	30-00	2,250	-35	9
Halifax, N. S.	S.	6	--	11	--	3	--	--	14	26-40	2,000	1-54	7
TOTALS		415	7,092	100	6	538	--	—	7,753	2686-40	236,581	-22	323

Main Training Depot of C.A.F. ø No Flying Undertaken on Sundays.

Aeroplane Machine Mileage = 234,581. Seaplane Machine Mileage = 2,000.

APPENDIX D

THE AIR BOARD
OTTAWA, CANADA.

SUMMARY OF FLYING OPERATIONS DURING SEASON OF 1921

FOR MAP LOCATIONS SEE SEPARATE SHEET – "MAP ILLUSTRATING FLYING OPERATIONS, ETC"

CANADIAN GOVERMENT DEPARTMENTS FOR WHICH OPERATIONS WERE UNDERTAKEN

Index Letter	DEPARTMENTS.
A.	AIR BOARD.
B.	DEPARTMENT OF INTERIOR.
B-1	Forestry Branch.
B-2	Geodetic Survey Branch.
B-3	Topographical Survey Branch.
B-4	Dominion Water Power Branch.
B-5	Dominion Parks Branch.
B-6	Reclamation Service.
B-7	International Boundary Commission.
B-8	Town Planning Branch.
C.	DEPARTMENT OF MINES.
C-1	Geological Survey Branch.
D.	DEPARTMENT OF MARINE & FISHERIES.
E.	DEPARTMENT OF AGRICULTURE.
E-1	Entomological Branch.
F.	DEPARTMENT OF CUSTOMS & INLAND REVENUE.
G.	DEPARTMENT OF RAILWAYS & CANALS.
H.	DEPARTMENT OF TRADE & COMMERCE.
H-1	Exhibits & Publicity Bureau.
I.	DEPARTMENT OF PUBLIC WORKS.
J.	DEPARTMENT OF MILITIA & DEFENCE.
K.	INTERNATIONAL JOINT COMMISSION.
L.	COMMISSIONER FOR NORTHERN MANITOBA.
M.	ONTARIO PROVINCIAL GOVERNMENT.
M-1	Forestry Department.
M-2	Mines Department.
N.	B.C. PROVINCIAL GOVERNMENT.
O.	QUEBEC PROVINCIAL GOVERNMENT.

CANADIAN AIR FORCE (CAMP BORDEN, ONT.) (REF. No 8)

NATURE OF OPERATIONS.	PLACE.	REF. NO.
Training of Officers and Airmen of C.A.F.	* Camp Borden, Ont.	8
Photographic Survey of Camp Area for Dept. of Militia & Defence.	Petawawa, Ont.	114
Combined Training with Royal Canadian Artillery	Petawawa, Ont. Sarcee, Alberta.	114 115
Combined Manoeuvres With Militia & Permanent Force on Staff Tour.	Kingston, Ont.	116
Combined Training With Military and Naval Forces.	Waters Off Halifax, N.S.	117
Communication Flying, Transit of Machines, etc	Ottawa, Ont. Pembroke, " Algonquin Park, " Muskoka Lakes, " Smith's Falls, " Kingston, " Belleville, " Port Hope, " Toronto, " Montreal, P.Q. Three Rivers, " Quebec, " Tadoussac, " Edmundston, N.B. Woodstock, " Fredericton, " St. John, " Windsor, N.S.	5 - 88 87 89 116 83 84 82 77 91 92 101 102 103 104 107 111

* Main Training Depot of C.A.F.

VANCOUVER, B.C. (REF. No. 1)

NATURE OF OPERATIONS.	DEPT. FOR	IN VICINITY OF	REF. NO.
Fishery Protection Patrols.	D	Vancouver, B.C. Straits of Georgia Gulf of Georgia Lower Fraser River	1 - - -
Photographic Reconnaissance of Mosquito Areas.	E-1	Lower Fraser River	-
Transportation and Demonstration.	J	Vancouver, B.C. Victoria, "	1 11
Forest Reconn., Photography and Fire Protection.	N B-1	Kamloops, B.C. Sicamous, " Revelstoke, " Shuswap Lakes " Mable Lake, " Adams Lake, " Lillooet Lake, " Powell Lake, " Harrison Lake, " Sumas Lake, " Lower Fraser Valley Thurloe Bay, B.C. Drury Inlet, " Quatsino Sd., "	12 13 14 - 15 16 17 18 19 20 - 21 22 23
Reconnaissance Patrols for Prevention of Drug Smuggling.	F	Vancouver, B. C. Victoria, " Straits of Georgia. Nanaimo, B. C. Comox, "	1 11 - 24 25
Transportation & Photographic Reconnaissance.	B-2	Kamloops, B.C. Sicamous, " Okanagan Lake, " Lillooet Lake, " Douglas Lake, " Cultus Lake, " Coquihalla Pass, " Lower Fraser Valley,	12 13 26 17 - - 27 -
Transportation, Cinematography, and Fishery Inspection.	D	Harrison Lake, B.C. Quatsino Sd., " Nootka Isl.. " Alberni, "	19 25 28 29
Reconnaissance of Water Shed.	B-4	Trout Lake, B.C.	30
Communication Flying, Transit of Machines, etc.	A	Ashcroft, B.C. Lytton, " Fraser River,	31 32 -

HIGH RIVER, ALTA. (REF. No. 2)

NATURE OF OPERATIONS.	DEPT. FOR.	IN VICINITY OF	REF. NO.
Forest Reconn., Photography & Fire Protection.	B-1	Bow River Forest Reserv Crowsnest " " Clearwater " "	35 36 37
Transportation, Exploration, & Photographic Reconnaissance.	B-6	Jasper Park, Alta. Banff Rky.Mtns.,Park, " Alta. Bow Lake & Valley, "	38 39 40
Photographic Survey of International Boundary Waters.	K B-6	Waterton Lakes, Alta. St. Mary's Lake, " Milk River, "	41 42 43
Fire Prevention Propaganda, Dropping Leaflets, etc.	B-1	Calgary, Alta. High River, " Brant, " Black Diamond, " Cochrane, " Pincher Creek, "	- 2 - - - -
Communication Flying, Transit of Machines, etc.	A	Calgary, Alta. Edmonton, " Lethbridge, "	- 44 45

VICTORIA BEACH, MAN. (REF. No. 3)

NATURE OF OPERATIONS.	DEPT. FOR.	IN VICINITY OF	REF. NO.
Forest Reconn., Photography, Transportation & Fire Detection.	B-1	Victoria Beach, Man. Manigotagan, " Berens River, " Norway House, " The Pas, " Cumberland House, Sask. Grand Rapids, Man. Cedar Lake, " Winnipegosis, " Sturgeon Bay, "	3 48 49 50 51 52 53 54 55 56
Transportation & Reconnaissance of Flooded Areas.	B-6	Cumberland Lake, Sask. Grassberry Lake, " Carrot R.Triangle.	- - -
Demonstration & Transportation.	L B-1	Victoria Beach, Man. The Pas, " Norway House, Cumberland House, Sask	3 51 50 52
Fire Prevention Propaganda, Dropping Leaflets etc.	B-1	Victoria Beach, Man. Grand Beach, "	3 -
Demonstration & Photographic Reconnaissance.	G H-1	Victoria Beach, Man.	3
Transportation & Photographic Reconnaissance.	C-1	Victoria Beach, Man. Manigotagan, " Lac du Bonnet, "	3 48 57
Photographic Reconnaissance.	I	Mouth of Red River, " " Bear "	- -
Communication Flying, Transit Of Machines, etc.	A	Winnipeg, Man.	58

N. ONTARIO MOBILE UNIT (SOUIX LOOKOUT) (REF. No. 4)

NATURE OF OPERATIONS.	DEPT. FOR.	IN VICINITY OF	REF. NO.
Forest Reconn., Photography, Transportation, & Fire Detection.	M-1	Sioux Lookout, Ont. Minaki, " Banning, " Allanwater, " Kenora, " Osnaburgh House, " Lake St.Joseph, " Cedar Lake, " Cliff Lake, " Lac Seul, " English River, "	4 61 62 63 64 65 - - 66 -
Intensive Timber Cruising, and Sketching.	M-1	Sioux Lookout, " Minaki, " Banning, " Allanwater, " Osnaburgh House, " Caribou Lake, " Lac Seul, "	4 61 62 63 66 67 66
Transportation & Demonstration.	M-2	Sioux Lookout, " Green Grass Lake " Osnaburgh House, "	4 - 65
Communication Flying, Transit of Machines, etc.	A	Port Arthur, " Sault St.Marie, " North Bay, "	68 69 90

OTTAWA, ONT. (REF. No. 5)

NATURE OF OPERATIONS.	DEPT. FOR.	IN VICINITY OF	REF. NO.
Photographic Surveying & City Mapping.	B-2 B-8	London, Ont. St.Catherines, " Welland Canal, "	72 73 -
Photographic Reconnaissance & Surveying.	K	St. Lawrence River. (Brockville-Montreal) Brockville, Ont. Cornwall, " Valleyfield, P.Q. Montreal, "	- 74 75 76 77
Transportation & Reconnaissance.	B-1	Haileybury, Ont. Lake Expanse, P.Q. Lake Dumoisne, " Grand L.Victoria, "	78 79 80 81
Experimental Photographic Surveying.	B-2 B-3	Ottawa, Ont. Gatineau River, P.Q.	5 -
Experimental Flying & Testing.	A	Ottawa, Ont.	5
Communication Flying, Transit of Machines, etc.	A	Montreal, P.Q. Toronto, Ont. Kingston, " Belleville, " Port Hope, " Peterborough, " Brantford, " Guelph, " Muskoka Lakes, " Pembroke, " Algonquin Park, " Smith's Falls, " North Bay, " Three Rivers, P.Q. Quebec, " Tadoussac, " Edmundston, N.B. Woodstock, " Fredericton, " St. John, " Windsor, N.S.	77 82 116 83 84 85 86 - 87 - 88 89 90 91 92 101 102 103 104 107 111

ROBERVAL, P.Q. (REF. No. 6)

NATURE OF OPERATIONS.	DEPT. FOR.	IN VICINITY OF	REF. NO.
Forest Reconn., Photography, Transportation & Fire Detection.	O B-1	Roberval, P.Q. Lake St.John, " Mistassini River, " Peribonka River, " Ashuapmuchuan R., " Lake Mistassini, " Peribonka Lake, " Rat Lake, " Stacker Lake, " Chef River, "	6 - - - - 95 96 97 98 99
Communication Flying, Transit of Machines, etc.	A	Chicoutimi, P.Q. Tadoussac, " Edmundston, N.B. Woodstock, " Fredericton, " St. John, " Windsor, N.S.	100 101 102 103 104 107 111

HALIFAX, N.S. (REF. No. 7)

NATURE OF OPERATIONS.	DEPT. FOR.	IN VICINITY OF	REF. NO.
Photographic Survey of International Boundary Waters.	B-7	St. Stephen, N.B. Oak Bay, " Milltown, " St.Croix River, "	108 - - -
Photographic Reconnaissance of Coast Line.	C-1	Yarmouth, N.S. Liverpool, "	109 110
Communication Flying, Transit of Machines, etc.	A	Windsor, N.S. St. John, N.B.	111 107

Mainly Erection & Repair Base.